

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claim 7 has been canceled and the subject matter therein has been incorporated into Claim 1. Claim 6 has been rewritten in independent form, except that it does not include the "mixing portion" limitation of Claim 1. This limitation has instead been introduced into new Claim 31. Intervening Claim 5 has been canceled. Claim 19 has been rewritten in independent form. Claim 21 has been amended to further recite a valve disposed in the exhaust gas flow passage, for example, the valve 414. The non-elected Claims 24-30 have been canceled.

New Claims 32-45 have been introduced. Basis for Claims 32-36 is found in Figure 8 and its description. Basis for Claims 37 and 38 are found in Figure 5 and its description. Basis for Claim 39 is found in Figure 12 and its description. Basis for Claim 40 is found in the paragraph bridging pages 51 and 52. Basis for Claim 41 is found in Figure 11 and its description. New Claim 42 is based on Claim 32 but deletes the recitation of a valve disposed in the first flow passage. New Claim 43 is based on Claim 37 but deletes the recitation of a valve disposed in the first flow passage. New Claim 44 is based on Claim 40 but deletes the recitation of a valve disposed in the exhaust flow passage. Basis for its dependent Claim 45 is also found in the paragraph bridging pages 51 and 52.

Claim 1 now includes the subject matter of canceled Claim 7. Claim 7 had been rejected under 35 U.S.C. § 103 as being obvious over U.S. patent 6,815,106 (Salvador et al) in view of WO 00/63993. The Examiner there recognized that Salvador et al does not teach a valve used to block the flow of hydrogen to a mixing portion for hydrogen and oxygen off gases from a fuel cell, but alleged that this would have been obvious in view of the valving shown in WO '993. However, Applicants respectfully submit that amended Claim 1 clearly defines over any combination of the above references.

According to the feature of the invention now set forth in Claim 1 and its dependent claims, a valve is disposed in a first flow passage which leads to a hydrogen-off gas exhaust port of a fuel cell and which may be opened or closed so that the hydrogen-off gas is allowed to flow into or is blocked from flowing into the mixing portion. For example, referring to the non-limiting embodiments of Figs. 1 and 6, this may be exemplified by the valve 414 in the line leading from the fuel cell to the mixing portion 411 (hydrogen diluter 424 in Fig. 7). Providing a valve in the hydrogen gas flow passage leading to the mixing portion permits the intermittent connection of the flow passage to the mixing portion for eliminating impurities (paragraph bridging pages 13-14).

Salvador et al discloses a fuel cell wherein the off gases are delivered to a combustor 30 via lines 10 and 24. The Examiner considers the combustor to be a mixing portion. However, as the Examiner has recognized, there is no description in Salvador et al that the hydrogen off gas line 10 leading to the combustor 30 is provided with a valve. The Examiner has therefore cited WO '993 to teach a valve, and has alleged that providing a valve in the line 10 of Salvador et al would have been obvious "to provide a system that safely stores hydrogen and utilizes the supplied hydrogen to its fullest extent without waste."

WO '993 discloses a fuel cell system in which the hydrogen off gas from the anode 2 of the fuel cell 1 is discharged through a line 5 to a separator 8a. The line 5 has a valve 7. There is no description in WO '993, however, that the line from the valve 7 leads to a mixing portion where the hydrogen off gas may be mixed with oxygen containing off gas. Thus WO '993 does not disclose a valve disposed in a flow passage leading to a mixing portion, and so could not suggest the inclusion of such a valve in the line 10 of Salvador et al if the combustor 30 were to be considered a mixing portion.

Claim 6 was rejected under 35 U.S.C. § 103 as being obvious over Salvador et al. Claim 6 recites the feature whereby the gas-liquid separator is positioned to separate out the

liquid content of the gases from the first and second flow passages, and a catalytic reaction portion which can reduce the concentration of hydrogen in the gas from the gas separator is connected to receive gases, i.e., downstream, from the gas-liquid separator. For example, referring to the non-limiting embodiments of Figs. 1 and 6, a gas-liquid separator may be found at 508 and a downstream catalytic reaction portion at 510.

Salvador et al discloses a combustor 30 which receives off gases from the fuel cell 4, and a *downstream* condenser in which condensed water is separated out to the return line 38. However there no description in Salvador et al that the combustor 30 is a *catalytic* reactor. Additionally, there is no description in Salvador et al that the combustor 30 is *connected to receive gases from* a gas-liquid separator. Salvador et al instead teaches that the condenser 36 receives exhaust gases from the combustor 30 -- *the opposite of the arrangement set forth in Claim 6*. Claim 6 therefore defines over Salvador et al.

Claim 6 was also rejected under 35 U.S.C. § 102 as being anticipated by U.S. patent 6,521,204 (Borup et al). However, Borup et al is less material to Claim 6 than is Salvador et al. Borup et al includes a combustor 16 which receives off gases from the fuel cell stack 76. However, *there is no description of a catalytic reaction portion or a gas-liquid separator connected to receive gases from the fuel cell*. Vaporizer 18 of Borup et al is located downstream from the combustor 16 and, in any case, is not a gas-liquid separator. Claim 6 therefore defines over this reference as well.

Claim 19 was also rejected under 35 U.S.C. § 103 as being obvious over Salvador et al in view of WO '993. Claim 19 further recites a fourth flow passage which leads to an oxidative gas-supplying port of the fuel cell and through which the supplied oxidative gas flows, a gas-liquid separator which is disposed in the second flow passage and which separates liquid contents from the discharged oxygen-off gas, and a fifth flow passage which leads to the oxygen-gas liquid separator and through which the liquid separated by the gas-

liquid separator is supplied to the fourth flow passage. For example, referring to the non-limiting embodiment of Figure 7, an oxidative gas supply flow passage 501 can receive water from the separator 520 in the oxygen gas exhaust flow passage 503.

The Examiner has recognized that Salvador et al does not disclose a “gas-liquid separator used for... the cathode exhaust,” but alleges that this would have been obvious in view of WO ‘993. Applicants note that WO ‘933 includes a gas-liquid separator 8b for the oxygen off gas from the cathode 4 of the fuel cell 1. However, there is no description of a flow passage which leads the liquid separated by the separator 8b to the oxygen being fed to the fuel cell. Instead, the branch line (having the pump 10) recycling off gas to the cathode in WO ‘993 branches at a point *upstream* from the separator 8b. Accordingly, WO ‘993 could not provide a teaching in Salvador et al for a (fifth) flow passage which leads to an oxygen-gas liquid separator and through which the liquid separated by the gas-liquid separator is supplied to an oxygen supply flow passage for the fuel cell.

Claim 21 recites a diffusion member which is disposed at an end of the exhaust flow passage and which can diffuse a gas flowing out from an opening at the end of the exhaust flow passage in the radial direction of the opening. Claim 21 now further recites a valve disclosed in the exhaust flow passage through which the hydrogen off gas is discharged to the atmosphere. Claim 21 had been rejected under 35 U.S.C. § 103 as being obvious over Salvador et al in view of German patent publication DE 4219113 (Heinen et al). As previously noted, Salvador et al fails to disclose a valve disposed in a hydrogen exhaust flow passage from a fuel cell. Since this is not taught in Heinen et al, amended Claim 21 is believed to define over any combination of the above references.

Concerning paragraph 34 of the Office Action, since Claim 20 depends from Claim 1 and since U.S. patent 6,630,260 does not overcome the shortcomings of the prior art with respect to amended Claim 1, Claim 20 is also believed to define over the prior art.

Since the newly introduced dependent Claims 31-41 all depend from one of Claims 1, 6 or 21, these claims are also believed to define over the prior art.

New Claim 42 recites that the mixing portion has larger diameter than that of said first and second flow passages. This is not taught in the prior art.

New Claim 43 recites that a diameter of the outlet port of the flow-rate reducing portion is smaller than that of the inlet port. This is not taught in the prior art.

New Claim 44 recites that the diffusion member is disposed at a portion of a body of the vehicle having the fuel cell system. This is not taught in the prior art.

An Information Disclosure Statement is submitted herewith to bring the Examiner's attention to U.S. patent publications 2003/0037983 filed on June 20, 2002 and 2003/0077488 filed on October 23, 2002.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,


OBLON, SPIVAK, McCLELLAND,  
MAIER & NEUSTADT, P.C.

Customer Number

**22850**

Tel: (703) 413-3000  
Fax: (703) 413 -2220  
(OSMMN 06/04  
RTP:smi

I:\ATTY\RTP\218209US-AM.DOC

  
Robert T. Pous

Registration No. 29,099

Attorney of Record

*Steven P. Weihrauch*  
*Reg. 32,829*